

Section 5

Risk Management Program

Introduction

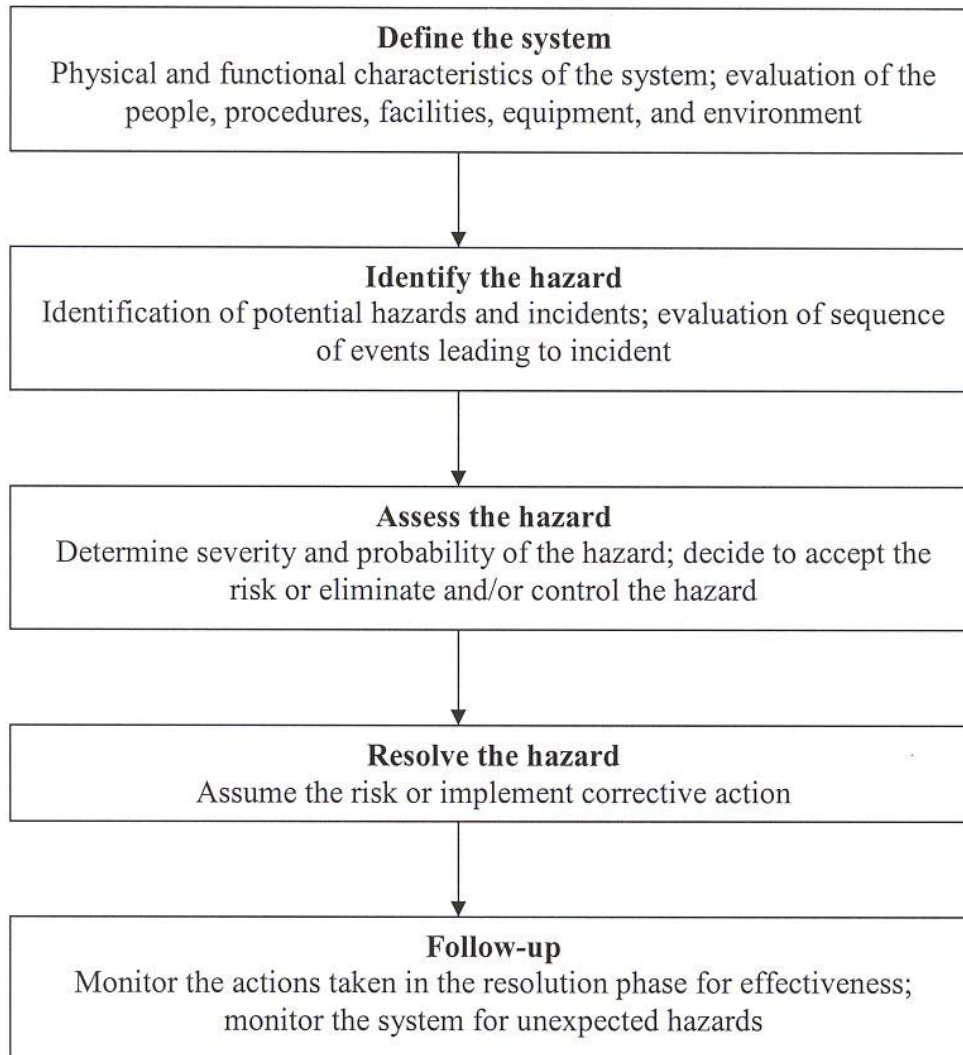
All transit agencies should be cognizant of their exposure to potential hazards and the liabilities resulting from them. Early detection and resolution of these safety hazards can avert many incidents and lessen their effects. Even those transit agencies with one vehicle can benefit from resolving hazards which may result in costly litigation and damages.

There are numerous losses that can result from incidents, some costs are difficult to determine but the following list may identify potential expenditures:

- ◆ payments for settlement of injury or death claims, including awards to dependents and for plaintiff legal fees
- ◆ payments for property damage claims which may not be covered by insurance:
 - replacement costs for vehicles, property, or other damaged items
 - loss of function and operations income
 - recovery and salvage of damage equipment
 - expenditures of emergency equipment and supplies
 - costs of emergency assistance
 - administrative costs
 - plaintiff's legal fees
 - lost time and wages
- ◆ legal fees for defense against claims
- ◆ punitive damages assessed
- ◆ costs of incident investigation
- ◆ corrective actions to prevent recurrences
- ◆ slowdowns in service while incident causes are determined and corrective actions are taken
- ◆ penalties for failure to take action to correct hazards
- ◆ lost time of transit personnel
- ◆ increased insurance costs
- ◆ loss of public confidence and ridership
- ◆ loss of prestige
- ◆ degradation of employee morale

There is no one risk management program or approach that is right for every transit agency. Due to the varying sizes and composition of fleet vehicles and employees, each transit agency needs to assess its own system and design a program specific to its particular needs.

The general process to a risk management program may visually be described as:



System Definition

All systems within a transit agency should be involved in the risk management process, including operations, safety, engineering, procurement, and maintenance. Each system should be defined by its physical and functional characteristics: equipment, procedures, people, and environment. Thorough knowledge and understanding of these individual elements and how they interface with each other is essential to identifying hazards.

Hazard Identification

The initial step in identifying potential hazards is to identify the incidents that may result if the hazards are not eliminated or controlled. A transit agency that has been [acquiring safety data](#) can organize and [analyze](#) the information by common elements looking for potential hazards.

Studying the sequence of events leading up to an incident can uncover the absence of, or weakness in, controls over the energy sources that cause incidents. It can reveal those areas that may expose the transit agency to more serious consequences. Examples of potential hazards warranting an analysis could include:

- ◆ security incidents
- ◆ biosafety
- ◆ confined spaces
- ◆ diesel and carbon monoxide emissions
- ◆ indoor air quality
- ◆ ergonomics in the vehicle and the workplace
- ◆ fatigue
- ◆ noise and vibration
- ◆ power tools and shop equipment
- ◆ temperature extremes
- ◆ welding, cutting, brazing
- ◆ workplace violence
- ◆ lockout/tagout
- ◆ powered industrial trucks
- ◆ fires
- ◆ vehicle incidents
- ◆ electrical hazards and power failures
- ◆ bomb threats
- ◆ acts of terrorism
- ◆ natural disasters (earthquake, flood, or tornado)
- ◆ hazardous material spills or intrusions
- ◆ slippery surfaces.

Reviewing the occurrence and handling of safety events at other transit agencies can also prevent many incidents before they occur. However, uniform reporting is an essential element in making statistical comparisons of incidents within the transit industry or with national or state trends.

Hazard Analysis

Hazard analysis should be conducted throughout the planning, design, construction, testing, operation, maintenance, and disposal phases of all transit projects. Hazard analysis can aid in implementing corrective actions based on how the transit agency could have handled each incident differently.

Transit management should rank each identified hazard according to its probability of occurrence. Ultimately, each transit agency should make their own determinations; however, some transit agencies may use a ranking system as depicted below:

Hazard Probability Categories

Description	Level	Specific Component or System	Fleet or Inventory
Frequent	A	Likely to occur frequently.	Continuously experienced
Probable	B	Will occur several times in the life of an item.	Will occur frequently
Occasional	C	Likely to occur sometime in the life of an item.	Will occur several times
Remote	D	Unlikely but possible to occur in the life of an item.	Unlikely but can reasonably be expected to occur
Improbable	E	So unlikely, it can be assumed occurrence may not be experienced.	Unlikely to occur, but possible

Risk Assessment

A comprehensive study of those facilities and systems most vulnerable to potential hazards is called a risk assessment. The risk is evaluated in terms of whether it will result in an incident and the benefits to be gained from accepting the risk. In its simplest terms, risk might be expressed as a product of the probability of an incident occurring from a potential hazard, the facility's or system's vulnerability to this hazard, and the potential damage costs:

$$\text{Risk} = \text{Probability} \times \text{Severity}$$

Starting with those facilities and systems with the highest probability and vulnerability, each hazard should be assessed based on the severity of damage to the transit agency:

- ◆ How are employees, facilities, passengers, and/or systems affected or damaged by this potential hazard?
- ◆ What is the best estimate of damage costs associated with this hazard?
- ◆ Approximately how often does this hazard occur?

Ultimately, each transit agency should make their own determinations; however, some transit agencies may use a classification system as depicted below:

Hazard Severity Categories

Category	Severity	Characteristics
I	Catastrophic	Death, severe environmental damage, or damage to areas with major financial impact or extended interruption of critical services

II	Critical	Severe injury, severe occupational illness, environmental damage, or damage to areas containing physical value, confidential information, or computer access to sensitive data/operational processing networks
III	Marginal	Minor injury, minor occupational illness, environmental damage, or damage to areas where disruption is moderately serious for the transit agency
IV	Negligible	Less than minor injury, occupational illness, environmental damage, or areas relatively unimportant to the transit agency operations

The following assessment table can then be created by combining the probability and severity rankings to categorize identified hazards:

Categories for Risk Assessment				
Probability/Severity	I (Catastrophic)	II (Critical)	III (Marginal)	IV (Negligible)
A (Frequent)	IA	IIA	IIIA	IVA
B (Probable)	IB	IIB	IIIB	IVB
C (Occasional)	IC	IIC	IIIC	IVC
D (Remote)	ID	IID	IIID	IVD
E (Improbable)	IE	IIE	IIIE	IVE

Legend	Hazard risk index	Acceptance criteria
	IA, IB, IC, IIA, IIB, IIIA	Unacceptable, management must take action
	ID, IIC, IID, IIIB, IIIC	Undesirable, management decision is required
	IE, IIE, IIID, IIIE, IVA, IVB	Acceptable with management review, requires monitoring
	IVC, IVD, IVE	Acceptable without management review

Hazard Resolution

By assessing those facilities and systems with a high probability rating and a high severity rating, crucial decisions can be made regarding the distribution of available resources. The costs and benefits of different options for managing risk must be considered with the transit agency's capacity to finance and administer these options. The transit agency may decide to control, transfer, remove, and/or accept the risk. Several examples for corrective actions may include, but are not limited to:

- ◆ Risk control
 - fire protective equipment for fire emergencies
 - protective shelters for employees during a tornado emergency
 - reassess work/shop layout for flood emergencies
 - fine tune background checks on operators
 - update training requirements
 - warning devices
 - preventive maintenance program
- ◆ Risk transfer
 - shift the burden of financial responsibility for potential losses to a third party, such as an insurer
 - evaluate “hold-harmless” clauses in contracts

- ◆ Risk removal
 - eliminate the use of the system, subsystem, or equipment that creates the hazard
- ◆ Risk acceptance
 - take financial responsibility for all or some portion of a potential loss
 - evaluate the deductible level set on vehicle collision insurance
 - evaluate insurance policies

Risk Management Example

The following example may help in understanding the risk management process. Risk assessment may focus on a number of potential hazards but this example will demonstrate the process for three hazards only; vandalism, robbery, and fire.

Hazard Identification. Transit management determines what hazards are most likely to occur and generates a list of potential hazards. The transit agency then assesses their facilities and systems based on this list of potential hazards.

For example, a review of past security incidents and input from local police indicates that acts of vandalism and robbery are possible. Fires are potential hazards that can start anywhere so they should be added to the list.

Hazard Analysis. While subjecting each facility and system to its vulnerability of vandalism, it is determined that the transit agency's control center might have a very low vulnerability to vandalism and be assigned a rating of E (improbable). In contrast, transit management may decide that robberies and vandalism are more likely in transit vehicles and facilities and assign higher ratings. The following is an example of how this transit agency may rank its vulnerability on these few selected hazards:

Vulnerability Analysis			
Facilities/Systems and Hazards	Vandalism	Robbery	Fire
Facilities			
• Dispatch Center	E	D	D
• Reception Room	C	C	D
Systems			
• Controls	E	E	D
• Electrical System	E	E	D
• Transit vehicles	B	C	C

Risk Assessment. Using the examples from this vulnerability analysis table, transit management assigns different severity ratings to these hazards. A higher severity rating may be given to a fire in the dispatch room because the movement of transit vehicles is greatly affected when dispatch equipment is damaged. This loss of equipment may also have consequences in passenger and driver safety, continuity in transportation service, loss in revenue, and security concerns. The following is an example of a risk assessment table created for these previously selected hazards:

Risk Assessment Table

Facilities/Systems and Hazards	Vandalism	Robbery	Fire
Facilities			
• Dispatch center	IE	ID	ID
• Reception room	IIIC	IIIC	IID
Systems			
• Controls	IE	IE	ID
• Power distribution	IE	IE	ID
• Transit vehicles	IVE	IC	IC

Hazard Resolution. Using the risk assessment table, transit management individually decides to control, transfer, remove, or accept each potential hazard. Since a fire in the dispatch room has the highest severity rating, transit management must take action on this hazard to reduce their exposure to financial and personnel loss. Examples of several options for managing and reducing the risk of a fire in the dispatch room may include but are not limited to:

- ◆ install a fire suppression system in the dispatch room (risk control)
- ◆ request a courtesy fire inspection of the transit facility from the local fire department (risk control)
- ◆ use two way radios to dispatch transit vehicles (risk removal)
- ◆ forward calls from the central telephone number to cellular phones (risk control)
- ◆ use a manual system, such as log sheets, with trip information for each transit vehicle (risk removal)
- ◆ provide a fire alarm system throughout the transit facility (risk control)
- ◆ instruct office personnel on proper evacuation of transit facilities (risk control)
- ◆ purchase special insurance for dispatch equipment (risk transfer)
- ◆ evaluate insurance policies for current replacement values (risk acceptance)

Follow-up

It is necessary to monitor the effectiveness of corrective actions and ensure that new hazards are not introduced as a result. An example of a corrective action may be the purchase of low floor vehicles to reduce passenger trips and falls. The low floor may cause vehicles to bottom out at high profile railroad grade crossings, so routes may need to be reviewed and rerouted.

As well, any changes through new contracts and agreements, new regulations and legislation, and any changes in system operations should have a hazard analysis conducted to identify and resolve any new hazards.